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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/787,381	02/26/2004	Florian O. Mertens	GP-304820	4785

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EXAMINER

WARTALOWICZ, PAUL A

ART UNIT	PAPER NUMBER
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1793

MAIL DATE	DELIVERY MODE
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04/29/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/787,381	Applicant(s) MERTENS ET AL.	
	Examiner PAUL A. WARTALOWICZ	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-88 is/are pending in the application.
- 4a) Of the above claim(s) 13,30-47,50-53,56,58-60,62 and 83 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12,14-29,48,49,54,55,57,61,63-82,84 and 88 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/4/6,9/28/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 2/6/08 have been fully considered but they are not persuasive.

Applicant argues that the respective hydrides are usable alone and in mixtures and that the individual hydrides and hydroxides are interchangeable in the practice of the method invention.

However, the standard is whether it would have been obvious one of ordinary skill in the art at the time the invention was made that the individual hydrides and hydroxides are interchangeable in the practice of the method. Even if the individual hydrides and hydroxides are interchangeable, *arguendo*, it would not have been obvious to one of ordinary skill to blindly interchange these compounds in the method, but would rather view the method as requiring those specific compounds.

Applicant argues that while the claimed hydrides and hydroxides are patentably distinct, they do not have a materially different design in the sense of the U.S. patent laws and practice because the claimed inventions overlap as more than one hydride and or hydroxide may be used in each process.

However, the different species of hydrides and or hydroxides do not overlap in scope. Even if the individual hydrides and hydroxides are interchangeable, *arguendo*, it would not have been obvious to one of ordinary skill to blindly interchange these

Art Unit: 1793

compounds in the method, but would rather view the method as requiring those specific compounds. Therefore, the species do not overlap in scope.

Applicant argues that the test of whether the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect does not apply because the respective hydrides and hydroxides may be used as mixtures in the claimed methods.

However, this is only one embodiment of the invention. There is at least one embodiment that requires only one particular hydride and hydroxide. That the respective hydrides and hydroxides may be used as mixtures in the claimed methods may be evidence that the inventions do not have a different mode of operation, but not evidence that the claimed inventions do not have a materially different design.

Additionally, the restriction requirement is deemed final and proper. Applicant has elected the species wherein both the hydride and the hydroxide comprise a lithium cation. Therefore, the claims drawn to this species are examined herein.

Additionally, it appears that claim 83 is non-elected because the hydride comprises MgH_2 and not LiH (the species elected in the instant invention).

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 1793

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-12,14-18, 48,49,67-71 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Amendola et al. (U.S. 2004/0033194).

Amendola et al. teach a method for hydrogen generation [0024] comprising reacting lithium borohydride [0030] and lithium hydroxide [0033] and water [0011].

If the reaction between lithium borohydride and lithium hydroxide and the reaction between the hydride and water is not inherent in the same manner as claimed,

Art Unit: 1793

it would be obvious based on the reasoned explanation that the solution mixture comprising the lithium borohydride and lithium hydroxide would at least partially result in a reaction between the two afore mentioned compounds.

Additionally, because the reactants are in mixture at the same time, it appears that the reactions would commence at the same time.

Applicant's specification recites: "Other preferred embodiments according to the present invention have an exothermic hydrogen production reaction and include reactions between a hydride composition $MI_{sup.x}H_{sup.x}$ and a hydroxide composition $MII_{sup.y}(OH)_{sub.y}$, where MI and MII are selected to be the same cationic species selected from the group consisting of Al, B, Be, Ca, Mg, Sr, and Ti. These reactions have a higher enthalpy of reaction."

Therefore, it appears that the thermodynamic nature of the reaction between the hydride and hydroxide depend on which cations are used. As Li is used for the hydride and hydroxide, it appears that the thermodynamic nature of the reaction is a property of these materials and therefore not distinguishable from the hydride and hydroxide used.

Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 2004/0033194) in view of Chen et al. (U.S. 6471936).

Amendola et al. teach a method of producing hydrogen as described above.

Amendola et al. fail to teach wherein the hydride is LiH.

Chen et al., however, teach a method of storing hydrogen (col. 1) comprising a material comprising lithium hydride and lithium hydroxide (col. 8).

Therefore it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide a material comprising lithium hydride and lithium hydroxide in Amendola et al. in order to store hydrogen produced in the reaction as taught by Chen et al.

The addition of the material would result in the reaction between LiH and LiOH as claimed.

Claims 19-25, 54-55, 61, 63-66, 72-81, 88 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 2004/0033194) in view of either Machin et al. ("Kinetics of the Reaction of Water Vapour with Crystalline Lithium Hydride") or Long et al. (U.S. 5593640).

Amendola et al. teach a method for hydrogen generation [0024] comprising reacting lithium borohydride [0030] and lithium hydroxide [0033] and water [0011].

If the reaction between lithium borohydride and lithium hydroxide and the reaction between the hydride and water is not inherent in the same manner as claimed, it would be obvious based on the reasoned explanation that the solution mixture comprising the lithium borohydride and lithium hydroxide would at least partially result in a reaction between the two afore mentioned compounds.

Additionally, because the reactants are in mixture at the same time, it appears that the reactions would commence at the same time.

Applicant's specification recites: "Other preferred embodiments according to the present invention have an exothermic hydrogen production reaction and include

Art Unit: 1793

reactions between a hydride composition $MI_{\text{sup}}.xH_{\text{sup}}.x$ and a hydroxide composition $MII_{\text{sup}}.y(OH)_{\text{sub}}.y$, where MI and MII are selected to be the same cationic species selected from the group consisting of Al, B, Be, Ca, Mg, Sr, and Ti. These reactions have a higher enthalpy of reaction.”

Therefore, it appears that the thermodynamic nature of the reaction between the hydride and hydroxide depend on which cations are used. As Li is used for the hydride and hydroxide, it appears that the thermodynamic nature of the reaction is a property of these materials and therefore not distinguishable from the hydride and hydroxide used.

Amendola et al. fail to teach wherein the hydroxide is $LiOH(H_2O)$.

Machin et al., however, teach a method for producing hydrogen (page 2205) wherein it is known to react lithium hydroxide hydrate with lithium hydride to produce hydrogen (page 2217).

Long et al. teach a method for making hydrogen (col. 1) wherein it is known to thermally decompose hydrates and hydroxides to generate water in the presence of unreacted hydrides to produce hydrogen (col. 6). Long goes on to teach that if these hydrides are unreacted in the presence of the hydrates and hydroxides, the results could be potentially dangerous (col. 6).

From this teaching, one of ordinary skill would recognize to have a mix of non-hydrated and hydrated hydroxides in Amendola et al. in order to control the reaction and not induce a dangerous result as taught by Long et al.

Additionally, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide react lithium hydroxide hydrate with

Art Unit: 1793

lithium hydride in Amendola et al. in order to produce hydrogen (page 2217) in a substantially similar process of making hydrogen as taught by Machin et al.

The addition of the material would result in the reaction between LiBH_4 and $\text{LiOH}(\text{H}_2\text{O})$ as claimed.

Claims 57, 82, and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 2004/0033194) in view of Chen et al. (U.S. 6471936) and either Machin et al. ("Kinetics of the Reaction of Water Vapour with Crystalline Lithium Hydride") or Long et al. (U.S. 5593640).

Amendola et al. teach a method of producing hydrogen as described above.

Amendola et al. fail to teach wherein the hydride is LiH .

Chen et al., however, teach a method of storing hydrogen (col. 1) comprising a material comprising a material comprising lithium hydride and lithium hydroxide (col. 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide a material comprising lithium hydride and lithium hydroxide in Amendola et al. in order to store hydrogen produced in the reaction as taught by Chen et al.

The addition of the material would result in the reaction between LiH and LiOH as claimed.

Amendola et al. also fail to teach wherein the hydroxide is $\text{LiOH}(\text{H}_2\text{O})$.

Art Unit: 1793

Machin et al., however, teach a method for producing hydrogen (page 2205) wherein it is known to react lithium hydroxide hydrate with lithium hydride to produce hydrogen (page 2217).

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Additionally, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide react lithium hydroxide hydrate with lithium hydride in Amendola et al. in order to produce hydrogen (page 2217) in a substantially similar process of making hydrogen as taught by Machin et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL A. WARTALOWICZ whose telephone number is (571)272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Paul Wartalowicz
April 26, 2008

/Steven Bos/
Primary Examiner
A.U. 1793